Gasguard®

CO2 Infra Red Transmitter/ Sensor Units

Designed and Manufactured in Australia by Ampcontrol Pty Ltd ABN 35 000 770 141 Phone: (02) 4903 4800 Fax: (02) 4903 4888 www.ampcontrol.com.au

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USER MANUAL 161296

Gasguard CO2 IR 04-09-2012

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Ampcontrol further reserves the right to alter the specification of the system and/or manual without obligation to notify any person or organisation of these changes.

Before You Begin

We would like to thank you for purchasing the Ampcontrol Gasguard Products. To become completely familiar with this equipment and to ensure correct operation, we recommend that you take the time to read this user manual thoroughly.

IMPORTANT WARNINGS AND ADVICE

1. **The sensors should not be stored in areas that contain solvent vapours. Some of these vapours are known to create false "high" zero points and may even damage the sensor electrodes. Similarly, the sensor should not be exposed to high levels of solvent vapours while in operation.**
2. **This equipment has been designed to detect hazardous gases and vapours and to give warning before they reach dangerous conditions. In order to ensure that the equipment will warn of dangerous situations it is essential that the instructions in this manual be read, understood and followed. It is further stressed that the effectiveness of the device depends heavily on the user who is responsible for its correct application, use and regular maintenance.**
3. **During start up, infra-red sensors will display a fault condition for approximately one minute before stabilising.**

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Document Revision History

Revision	Date	Comment
Rev0	03-06-2008	Initial issue
Rev1	04-09-2012	Cert. Update

SECTION 1 - DESCRIPTION

1.1 Introduction

This manual provides installation, commissioning, and calibration and maintenance instructions for the Ampcontrol Gasguard Sensor Units. Because the units are passive monitoring devices, operating instructions are not applicable to this equipment.

This Gasguard sensor unit consists of:

- Infra-red Carbon Dioxide Sensor (CO2)
- Transmitter Amplifier PCB Assembly
- IP 66 Transmitter Enclosure

For which the following instructions and diagrams are included in this manual:

- Installation
- Commissioning
- Maintenance
- Sensor Wiring Diagrams
- Stainless Steel Housing Enclosure Dimensions

Unique part numbers in accordance with the following scheme identifies the sensor unit configurations:

- Part Number 65-6552XXX series is for Infra-red sensor units.

Note:

In the part numbers listed above, XXX represents the chemical symbol for the gas detected by the unit. For example, 65-6552CO2-2 is the part number for an Infra-red transmitter unit designed to detect Carbon Dioxide (CO2) in the range of 0 -2%.

1.1.1 Gasguard CO2 Transmitter/Sensor Unit Dimensions

Figure 1.1 shows the bottom and front view of the Infra-red Sensor.

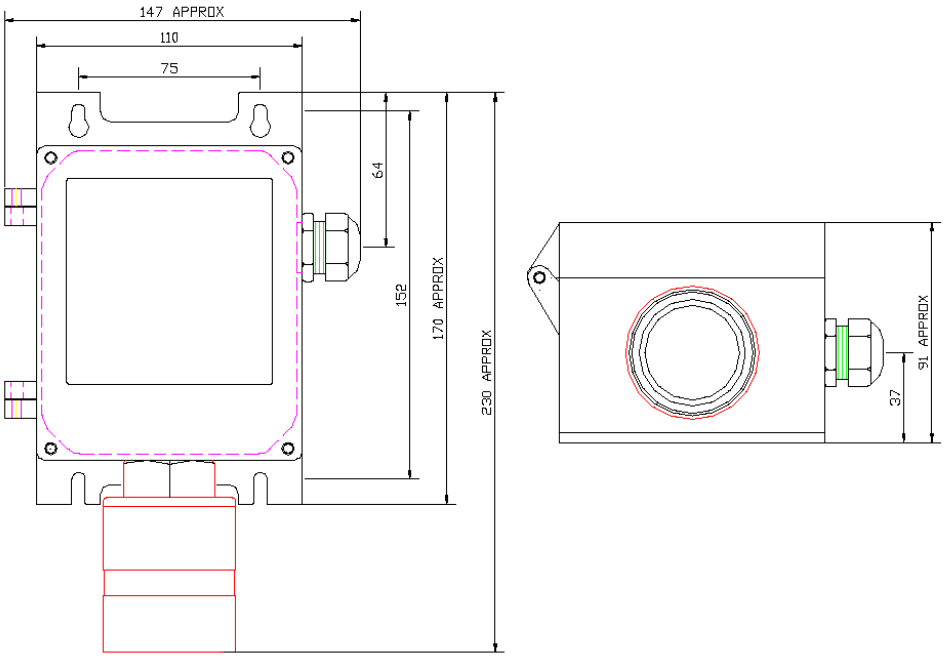

Figure 1.1 Dimensions – Infra-red Sensor

Weight approx. 3.8KG

1.1.2 General Description

The Transmitter/Sensor assembly is an IEC Ex ia Group I certified assembly.

The Certification is based on the unit being sealed to IP 66 and the appropriate checks being made on the Intrinsically Safe Parameters of the overall system the transmitter is connected into.

The Transmitter and Sensor can be mounted as an integral device but there is also an option to mount the sensor separately up to 10m from the transmitter. In the remote configuration the sensor is factory fitted with a type 2S cable which is potted directly into the sensor assembly.

The sensor is designed to provide a standardised output applicable for the gas range. This signal is not for direct connection to other devices and so the amplifier PCB in the transmitter housing is used to condition the signal, provide calibration functions and produce a 4-20mA signal.

The transmitter and amplifier assembly is configured in the factory for a specific gas range.

1.1.3 Transmitter / Sensor Specifications

Specification data for the sensor is contained in Table 1.1.

GAS	CO2
Detection Method	Non Dispersive Infra-red
Maximum Range	0- 2% or 0- 5%
Overall Linearity	<± 5% of Full Scale
Maximum Drift	Zero, <±2.5% of Full Scale per month Sensitivity, <±5% of Full Scale per month
Repeatability	<± 2.5% of Full Scale
Response Time (T90)	<45 Seconds (Typical)
Infra-red Lamp Life	>5 Years
Resolution	0.01%
Humidity (RH non-	0 – 90%
Temperature Range, Operation &	-10 to + 60° C
Power Requirements.	12VDC @ 100mA
Input Parameters J5	Ui=16.5V Li=10.35µH Ci=40nF
Voltage Range	10 – 16.5V DC
Warm up time	10 minutes
Warranty	1 Year

Table 1.1 Sensor Specification Data

1.2 Sensor

1.2.1 Carbon Dioxide Gas Sensor

The Carbon Dioxide Gas Sensor works on the infra-red gas absorption principle. An infra-red light source illuminates the sensor through a gas pathway with an optical filter that selects the appropriate wavelength for the gas being detected; the presence of this gas reduces the amount of infra-red energy reaching the detector. This difference in infra-red energy with and without gas is used to measure the amount of gas present, and is converted to an electrical output of 4–20mA by the amplifier electronics.

1.2.2 Humidity

Sensors cannot operate in a condensing atmosphere. In such an environment, a thin film of water can form across the membrane, effectively sealing it and stopping the passage of gas into the sensor. On evaporation of this water the sensor usually resumes normal operation. Above 90% R.H. the sensor accumulates water vapour and may form condensation to block the infra-red path used for gas detection. Provided the exposure to these extremes of humidity has not been for a long period, the sensors will recover when exposed to R.H. in the range 15% to 90%.

1.2.3 Pressure Effects

The infra-red sensors do not exhibit a permanent response to changes of pressure. The CO2 sensor responds to pressure on a directly proportional basis.

1.2.4 Operational Restrictions

For proper operation, infra-red detectors need to be in a position which is free from damaging vibration and within the temperature range of -10C to +60C.

1.3 Amplifier PCB

1.3.1 Infra-Red Amplifier PCB

The purpose of the Amplifier PCB is to convert the low- level electrical output of the sensor into a signal capable of driving various types of external indicator equipment such as the Ampcontrol Gasguard 4 Channel Controller.

The Amplifier PCB requires a 12VDC operating voltage and transmits a signal of 4-20mA. At the lower end of the range, the 4mA signal level indicates a zero gas concentration. At the upper end of the range the 20mA signal indicates that the sensor has detected a full span gas concentration. ZERO and SPAN adjustment reed relays located on the PCB are used for calibration of the instrument.

1.4 Enclosures

1.4.1 Stainless Steel Housing

The standard Stainless Steel Housing, Part Number 105994 (shown in Figure 1.1), incorporates the I/R Sensor and Amplifier PCB. The housing is robust and is corrosion resistant. It is suitable for almost all applications and provides for easy installation and maintenance. When properly used it gives many years of efficient operation.

1.5 Sensor Wiring Assembly

1.5.1 Connections

Electrical connections for the sensor are by means of a shielded cable from the Sensor Assembly 105997.

A sensor wiring assembly provides the electrical interface between the sensor and the Amplifier PCB. The sensor wiring plugs into the Amplifier PCB connector J4.

A second wiring assembly connects the customer supply and signal connections from the incoming terminals to the Amplifier PCB connector J5.

The Sensor and Amplifier assemblies are intrinsically safe items and as such are only serviceable by authorised factory personnel.

See Figure 2.1 Section 2, Page 6 for wiring details.

Note:

Only sensor assembly 105990 may be connected to the main amplifier in this unit. Connection of any other type of sensor head will render the unit non-operational.

Customers should ensure that the correct range Sensor and Transmitter assemblies are matched together.

1.5.2 Optional Anti-Vibration Clip

An optional Anti-Vibration clip Pt/No. 121647 can be fitted to the connectors J4 & J5 on the rear of the Amplifier PCB.

This is only needed in areas of high vibration.

Figure 1.2 Anti-Vibration Clip

SECTION 2 - INSTALLATION

2.1 Installation Guidelines

To ensure continued reliable operation of the sensor system, the following installation guidelines should be observed:

- Confirm the Intrinsically Safe parameters of the transmitter, cables and power supply are suitable for the application.
- Select a suitable central location for mounting with good access. The location should be as clean and dry as practicable and at a temperature as close to 20°C as practicable.
- Mount the sensor unit in a position that reduces the risk of mechanical damage.
- Mounting should be to a vertical surface, pointing downwards, allowing for easy wiring access and subsequent servicing.
- It is essential that the sensor be positioned to take into account the expected flow of the gas to be measured.
- Allow sufficient space under the sensor for fitting of calibration cups or accessories.

2.2 Relative Density

The relative density or buoyancy of the gas or vapour with respect to air determines its propensity to rise or fall when released into the atmosphere.

Gases or vapours with buoyancy less than air will tend to rise from the source of release.

Conversely, gases or vapours heavier than air will tend to fall and accumulate in concentrations over long periods of time. Normal air movements in and around such gas concentrations will have the inevitable effect of producing zones of highly toxic mixtures.

This knowledge of the characteristics of the gas assists when determining the location of the gas sensor. See Table 2.1 for gas density values.

For monitoring of heavier-than-air gases, mount the sensor as close as practical to the floor or ground. For monitoring of lighter than air gases, install the sensor unit as high as practical.

The services of a Risk Assessment Engineer or specialist should be used if additional assistance is required in selecting the position of, or the number of sensors required for the application.

Gas	Density
Hydrogen	LIGHTER THAN AIR
Ammonia	
Methane	
Carbon Monoxide	
Carbon Dioxide	HEAVIER THAN AIR
Nitric Oxide	
Oxygen	
Hydrogen Sulphide	
Chlorine	
Nitrogen Dioxide	

Table 2.1 Gas Density

2.3 Cable Resistance Considerations

The Infra-red Amplifier PCB output is 4-20mA current. The voltage available to the amplifier must be a minimum of 10VDC. With a supply voltage of 12VDC the maximum cable resistance, both +ve & -ve leads combined, is 16 Ohms. The maximum resistance in the 4-20mA signal to ground at 12V DC supply is 200 Ohms. See Table 2.2 for typical cable resistance values.

Conductor Area mm2	Loop Resistance
0.5	6.71
1	3.36
1.5	2.24
2.0	1.72
2.5	1.38

Table 2.2 Nominal Resistance Values for Wire Sizes

2.4 Earthing Procedures

Consideration should be given to the earthing of the transmitters and cable screens of the incoming customer cables.

Normal practice would be to isolate the cable screens at the Transmitter and connect the screens to earth adjacent to the Control units or power supply to the system.

Remote sensor cable screens should be earthed at the transmitter.

2.5 Wiring

Figure 2.1, Page 6 shows the wiring of the infra-red transmitter with built in Sensor. Figure 2.2 details the Remote head version.

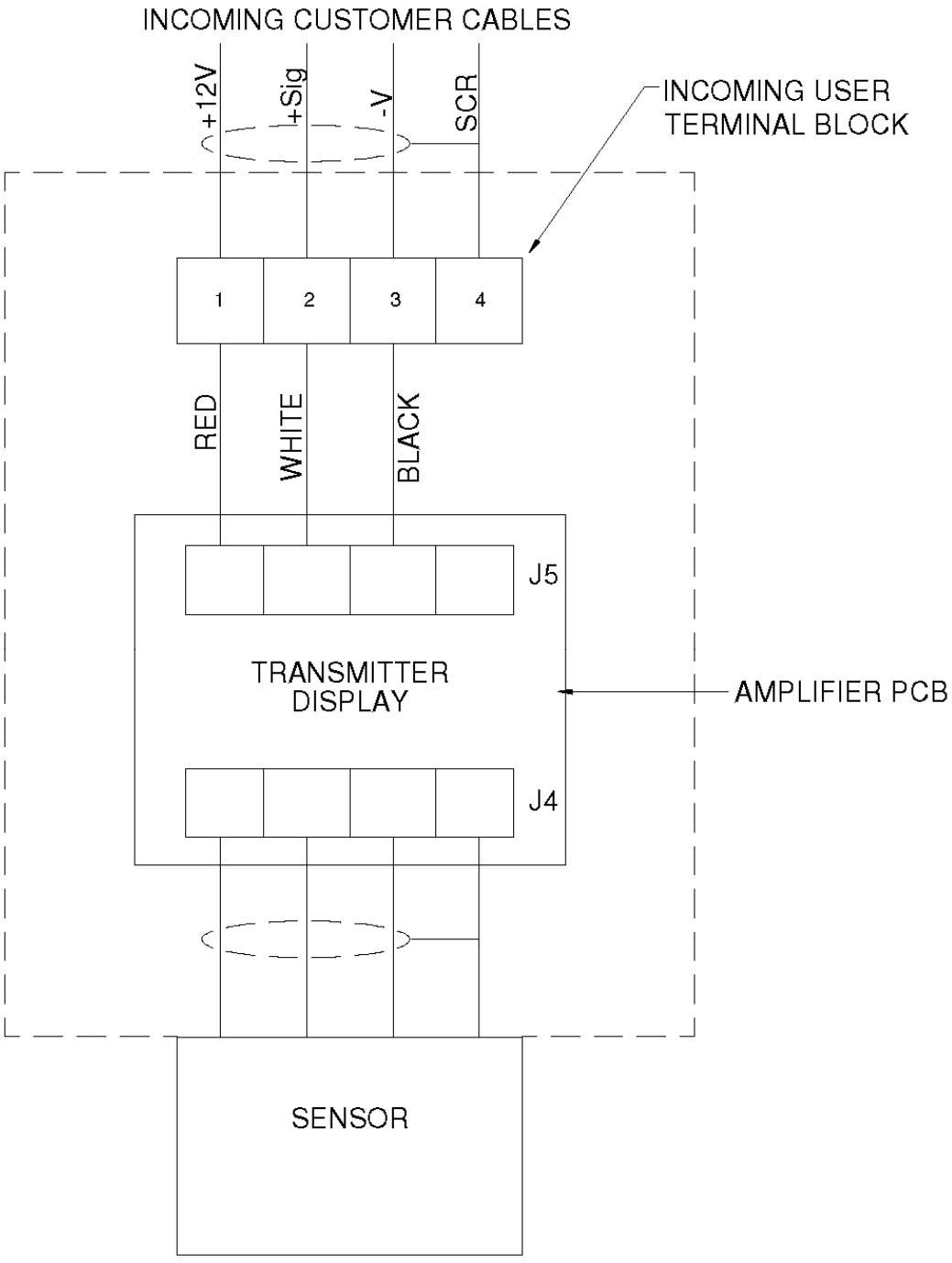

Figure 2.1 Infra-red Sensor Unit Wiring Diagram

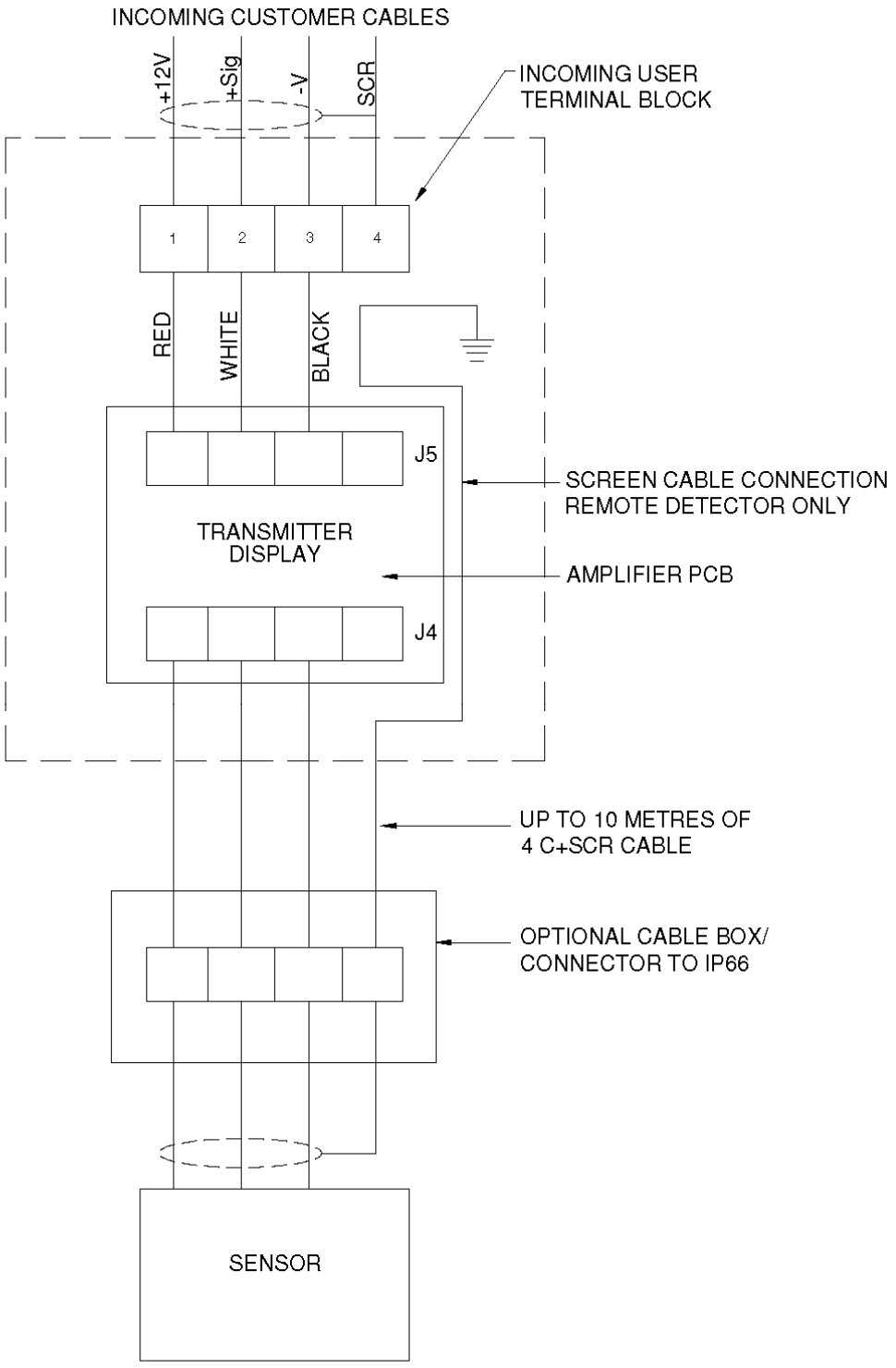

Figure 2.2 Remote Infra-red Sensor Unit Wiring Diagram

SECTION 3 - COMMISSIONING AND CALIBRATION

3.1 Introduction

Commissioning is the performance of initial checks, adjustments and calibration prior to placing the system in operation for the first time. Calibration, however, is not limited to performance of commissioning. Calibration is also performed throughout the life of the system on a periodic basis and after major repairs to the system.

During commissioning and subsequent re-calibration, it is vital to ensure that procedures are followed to prevent any abnormal sensor signal from initiating any fault, warn or alarm status indicator or equipment control function, on auxiliary equipment connected to the transmitter. Consult the relevant control unit manual for details of how to do this.

The instruments supplied are NATA calibrated prior to delivery. However, before putting the system into operation, it is recommended to check the calibration. This is especially important if the instruments are commissioned some time after delivery.

3.2 Preliminary Checks

Perform the following preliminary checks:

a) Verify that all connections are correct and installation complete as detailed in Section 2.
b) Check that voltage available to the amplifier is 12VDC
c) Apply power to the system.

Note: Following initial application of input power the display will alternate between PU & Ir for approx. 10 secs while it warms up, to show the unit is Infra-red. The output is held at a nominal 4mA during this period, after which it displays -0.46 for up to 30 seconds before reading zero +/- 0.05% (Providing no gas is present).

3.3 Gasguard Display Panel

To assist in fault finding the Gasguard display panel will indicate the following:

Display	Description
-777	There is no sensor plugged into the amplifier
-999	Amplifier needs reconfiguration
Er	Error has occurred
CAL	Calibration mode initiated (display blinks when in calibration mode)
SAU	Calibration settings have been saved
PU/Ir	Powering Up - Infra-red Unit

Table 3.1

3.4 System Calibration

Before the start of calibration, the system should be left in a powered-up operational (no fault) state for one hour to allow the gas sensors to stabilise. However, if such a delay is not practical, observe the display indications with the sensor in a gas free atmosphere, until there is no appreciable display movement for a period of time. The system should then be sufficiently stable to allow calibration. During calibration, avoid breathing over unit, since carbon dioxide from exhaled breath will affect the readings.

- Calibration of sensors can only be achieved by using the appropriate gas. That is the gas that the sensor is designed to detect. A calibration gas should be 50% of full scale of the relevant monitor.
- For gas detection, if reading inaccuracies cannot be avoided, sensors should always be calibrated on the high side for safety reasons.
- Calibration gas should be applied to the sensor at a rate of approximately 0.5 to 1.0 litre per minute, using the Calibration Cup. Allow sufficient time, usually about 2 minutes, for sensor to stabilize before adjustment.

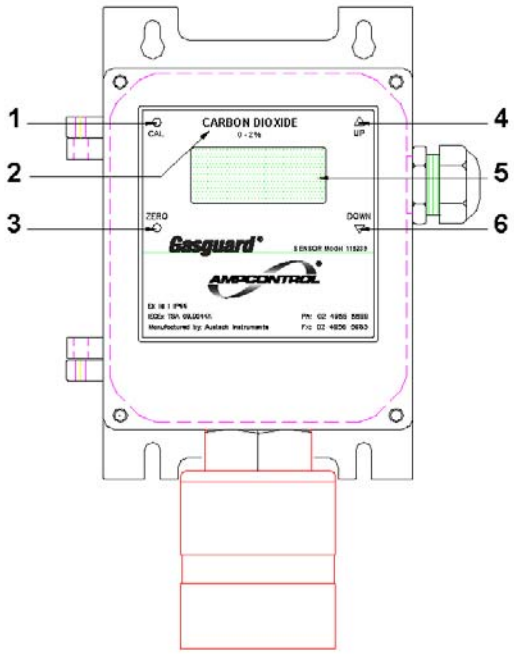

Figure 3.1 Gasguard CO2 Control Panel

3.5 Zero Calibration

Perform Zero Calibration as follows:

a) Ensure that the sensor is in a fresh air environment, and apply High Purity Nitrogen via the Calibration Cup.
b) Place the magnetic tip of the calibration pen over the CAL symbol (1) for 5 seconds. The display will flash every 1-2 seconds while in calibration mode.
c) Now that the CAL mode is accessed place the magnetic tip over the ZERO symbol (3) for 2-3 seconds.
d) The display should have changed to a zero reading. To save the zero setting place the magnetic tip over the CAL symbol (1) for 5 seconds.
e) The sensor display (5) will show SAU to confirm that it has saved the zero setting. The display will cease to flash.

3.6 Span Calibration

Perform Span Calibration as follows:

a) Apply CO2 calibration gas to the sensor at the rate of 0.5 to 1 litre per minute. Use a calibration gas of suitable concentration between 1% to 2% CO2 for the 2% range unit or 2.5% to 5.0% for the 5% range unit.
b) To adjust the display so that it reads the correct value for the gas applied enter Calibration Mode by placing the magnetic tip of the Calibration pen over the CAL symbol (1) for 5 seconds. The display will flash every 1-2 seconds.
c) Place the magnetic tip of the pen over the UP symbol (4) to increase the display reading and over the DOWN symbol (6) to decrease the display reading.
Place the magnetic tip over the CAL symbol (1) for 5 seconds once the display reads the correct value for the gas applied. The display will cease to flash.
d) Shut off the calibration gas. If the Zero calibration is to be checked, wait for the sensor to stabilise before proceeding.

Note: Human breath contains a high concentration of CO2 and this may cause the instrument to read above zero.

3.6.1 Calibration Problems

Gasguard Sensor/Transmitter Fault Codes.

Refer Table 3.1

If during calibration or zero of the Gasguard CO2 Transmitter the fault indication on the local display is shown as “ERR” then possible reasons are as follows:

1. Calibration

If the fault code appears during calibration it will normally be when adjustment by the Up or Down arrows is attempted. The code indicates that the output of the sensor is insufficient and the sensor will need to be changed.

Several things should be checked before changing the sensor.

a) Check the calibration gas. It should be a correct range in air mixture although other trace gases may be present. Lower percentage gas mixtures will reduce the output leading to unnecessary change out of the sensor.
b) Check the gas flow to ensure it is within 0.5 to 1.0 Litres/min.
c) Check the surrounding airflow. If the ambient air flow is above 1.5 Metres/sec it can dilute the calibration gas. Use a shield or bag over the sensor if there is a high wind speed.
d) Check sensor is not blocked with dust or mud. The sensor can be washed out and calibration carried out after drying.
e) If all the above are OK and confirmation of sensor output is required it can be measured with a DVM.
   The signal voltage developed at the sensor can be measured at the third terminal from the left on the four way plug marked “Sensor” on the back of the amplifier board. With zero gas present this voltage should be 1.9 +/-0.05VDC measured with respect to 0V. With full span gas applied this voltage should rise to around 2.1 +/-0.05VDC. If this change in voltage cannot be achieved then the sensor may need to be replaced.

2. Zero

The sensor zero balance is required to be within a preset level and if the sensor is damaged the zero shift may take it outside the limit. Once this occurs the “ERR” indication is shown when trying to zero the instrument, and the sensor should be replaced.
If during a calibration or zero procedure the instrument fails to complete the process, the original settings prior to entering Cal mode will be retained. If left in Cal mode the instrument will revert to normal mode after about 5 minutes, retaining its last settings.

3. Erratic readings

Check the tightness of screw terminals on the connectors and check connectors are pushed fully home. Fit anti vibration clip if the problem persists.

SECTION 4 - MAINTENANCE

4.1 Periodic Maintenance

Periodic maintenance consists mainly of scheduled checks to ensure the instrument remains in adjustment and gives the required response to sampled gas. The following maintenance schedule is recommended.

Daily:
Verify operation by visually checking the reading on the respective control unit/monitor. Investigate any abnormal deviations from expected background levels.

Monthly:

a) Check the Zero reading in Nitrogen for one minute; re-adjust non zero as necessary.
b) Check the Span calibration on a known sample of CO2 gas in air. Re-adjust as necessary.

As Required:
Replace sensor whenever it becomes impossible to adjust to Zero, or when the Span adjustment is insufficient to enable adjustment to the calibration gas value. If this occurs, recalibrate the unit as described in Section 3: Commissioning and Calibration.

Following Power Removal:
If power has been removed from the unit for more than a week, a re-commissioning check should be carried out.

4.2 Corrective Maintenance

During maintenance it is vital to ensure that suitable procedures are followed to prevent any abnormal sensor signal from unintentionally operating any fault, warn or alarm status indicator, or equipment control function. Consult the relevant control unit manual for details as to how to do this.
There are only two active replaceable units in the sensor system, the Amplifier PCB and the IR Sensor Assembly. Therefore, fault isolation is limited to the following possible faults and remedies.

No 4-20mA Output:

a) Check that voltage applied to the Amplifier PCB is 12VDC and that the polarity is correct.
b) Check for loose plug and terminal connections.
c) If Step a) above is correct and the problem persists, replace the Amplifier PCB.

Sensor cannot be Spanned or Zeroed:

a) Check that voltage and polarity applied to the amplifier is correct.
b) Check for loose plug and terminal connections.
c) If the above is correct and the problem persists replace the Sensor.
d) If the sensor still cannot be spanned or zeroed replace the Amplifier PCB.

Erratic Output:

a) Check that voltage and polarity applied to the Amplifier PCB is correct. Also, check that there are no severe voltage swings, indicating an intermittent fault in the field wiring or control unit.
b) Check for loose plug and terminal connections.
c) If the above is correct and the problem persists, replace the sensor. d) If the output is still erratic, replace the Amplifier PCB.

SECTION 5 - EQUIPMENT LIST

Part #	Approval Part #	Description
115239	65-6552CO2-2	Carbon Dioxide Gas Sensor/Transmitter, Range 0 -2% CO2
115240	65-6552CO2-5	Carbon Dioxide Gas Sensor/Transmitter, Range 0 -5% CO2
105997	61-6552CO2-2	CO2 Sensor Head Assy, Range 0 -2% CO2
105997	61-6552CO2-5	CO2 Sensor Head Assy, Range 0 -5% CO2
105441	75-6557LB	Replacement Amplifier
121647	PCB E10051	Anti-Vibration Clip

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx TSA 06.0044X issue No.:2	Certificate history: Issue No. 2 (2012-2-15) Issue No. 1 (2008-6-11) Issue No. 0 (2007-2-27)
Status:	Current	
Date of Issue:	2012-02-15	Page 1 of 4

Applicant:
Ampcontrol Pty Ltd
7 Billbrooke Close
Cameron Park NSW 2285
Australia

Electrical Apparatus: **Gas Sensor/Transmitter, Gasguard Series 65-655x**
Optional accessory:

Type of Protection: **Ex ia**

Marking:
Ampcontrol Gas Sensor/Transmitter, Gasguard Series 65-655x
Ex ia I IP66
IECEx TSA 06.0044X
Serial No. _____

Approved for issue on behalf of the IECEx Certification Body: Ujen Singh

Position: Quality and Certification Manager

Signature: (for printed version)

Date: 15 FEBRUARY 2012

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3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

TestSafe Australia
919 Londonderry Road
Londonderry NSW 2753
Australia

IECEx Certificate of Conformity

Certificate No.: IECEx TSA 06.0044X

Date of Issue: 2012-02-15 Issue No.: 2

Manufacturer:

Ampcontrol CSM Pty Ltd
9/5 Vuko Place
Warriewood NSW 2102
Australia

Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2004 Edition: 4.0	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 1999 Edition: 4	Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsic safety 'i'

This Certificate does not indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:
AU/TSA/ExTR06.0068/00 AU/TSA/ExTR08.0004/00 AU/TSA/ExTR11.0081/00

Quality Assessment Report:

AU/ITA/QAR06.0002/05

IECEx Certificate of Conformity

Certificate No.: IECEx TSA 06.0044X

Date of Issue: 2012-02-16 **Issue No.: 2**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

The Gas Sensor/Transmitter Gasguard 65-655x series use a common transmitter section with alternate sensors to suit the gas being sensed. The transmitter uses an external d. c. power supply. A serial communication port, an RS 485 port and a programming port, available internally within in the apparatus, are only to be used by the manufacturer in a safe area. The sensor reading is displayed on an LCD display panel.

The Gasguard 65-6552-CO2 has an infrared CO_2 sensor head. The sensor head can either be fixed on the transmitter or remotely connected by a specified cable.

The Gasguard 65-6551-CH4 has a catalytic sensor head. The sensor head can either be fixed on the transmitter or remotely connected by a specified cable.

CONDITIONS OF CERTIFICATION: YES as shown below:

Please refer to Annexe of the certificate.

IECEx Certificate of Conformity

Certificate No.: IECEx TSA 06.0044X

Date of Issue: 2012-02-15 **Issue No.: 2**

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

Please **refer to Annexe of the certificate.**

Annexe: Annexe for IECEx TSA 06.0044X-2.pdf

IECEx Certificate of Conformity Annexe

Annexe for Certificate No.:	IECEx TSA 06.0044X	Issue No.:	2

Conditions of Certification pertaining to Issue 0 of this Certificate:

1. It is a condition of safe use that the following input parameter of the apparatus for terminal J5 shall be taken into account during installation:

Parameters	J5 terminals
U_i	16.5 V
C_i	40 nF
L_i	10.34 µH

2. It is a condition of safe use that the remote sensor head shall be connected through a specified cable, which has parameters of 206 nF/km and 423 µH/km. The cable length shall not exceed 10 metres.

3. It is a condition of safe use that the programming connector J6, RS485 port J1 and the communication connector J3 are only to be used by the manufacturer in a safe area.

4. It is a condition of safe use that only GasGuard IR CO_2 sensor head can be used in the apparatus.

Drawing list pertaining to Issue 0 of this Certificate:

Document No.	Sheets	Document Title	Issue	Date (yyyy/mm/dd)
75-6561L-VE1	1	GasGuard IR CO2 Optical Bench Interface Board	E1	2006/11/16
75-6562L-VE3	1	GasGuard IR CO2 Processor Board	E3	2006/11/16
75-6563L-VE	1	GasGuard IR CO2 Sensor Board	E	2006/07/09
75-6564L-VE	1	GasGuard IR CO2 Lamp Board	E	2006/06/15
75-6565L-VE2	1	GasGuard IR CO2 Isolation Board	E2	2006/09/13
24-6561L-VE	4	GasGuard IR CO2 Optical Bench Interface Board	E	2006/04/13
24-6562L-VE2	4	GasGuard IR CO2 Processor Board	E2	2006/04/13
24-6563L-VE	3	GasGuard IR CO2 Sensor Board	E	2006/04/13
24-6564L-VE	3	GasGuard IR CO2 Lamp Board	E	2006/04/13
24-6565L-VE1	3	GasGuard IR CO2 Isolation Board	E1	2006/06/15
25-0020L-01	1	Retaining Ring H.D I.R Sensor Manufacturing Details	0	2006/01/11
25-0021L-01	1	Sinter, Cupro Nickel H.D. I.R Sensor Manufacturing Details	2	2006/07/27
25-0022L-01	1	Housing Body H.D I.R Sensor Manufacturing Details	1	2006/02/06
25-0023L-01	1	Housing Top H.D I.R Sensor Manufacturing Details	1	2006/02/06
35-5501L	1	Mounting Plate H.D I.R Sensor Manufacturing Details	2	2006/09/12
35-5502L	1	Mount Detector H.D I.R Sensor Manufacturing Details	1	2006/09/12

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IECEx Certificate of Conformity Annexe

Annexe for Certificate No.:	IECEx TSA 06.0044X	Issue No.:	2

Document No.	Sheets	Document Title	Issue	Date (yyyy/mm/dd)
35-5503L	1	Mount Light Source H.D. I.R Sensor Manufacturing Details	1	2006/09/12
35-5504L	1	Lamp, Detr Block & Mounting Plate Heavy Duty Infrared Sensor Assembly Details	0	2006/02/23
61-6552CO2-01	1	Sensor CO2 Gasguard Infrared General Assembly	2	2006/09/12
61-6552CO2-02	1	Lamp Block Heavy Duty Infrared Sensor General Assembly	2	2006/09/12
61-6552CO2-03	1	Detector Block Heavy Duty Infrared Sensor General Assembly	1	2006/05/16
61-6552CO2-04	1	Reflector & Lamp / Detr Block CO2 Heavy Duty Infra Red Sensor General Arrangement	2	2006/09/12
65-6552CO2-01	1	CO2 H.D I.R Transmitter With Display In Stainless Steel Enclosure Layout & Wiring	2	2006/09/11
65-6552CO2-02	1	Detector CO2 Remote In Stainless Steel Enclosure Layout & Wiring	0	2006/09/15
65-6552CO2-R-01	1	Detector CO2 Remote With Cable Box / Connector General Arrangement	0	2006/09/15
29-6554CO2-01	1	Label CO2 In S/Steel Enclosure Manufacturing Details	0	2006/09/14
29-6555CO2-01	1	Label CO2 2% In S/Steel Enclosure Manufacturing Details	0	2006/09/14

Variations Permitted by Issue 1:

1. The Sensor/Transmitter Gasguard series 65-6551-CH4 was added in the certificate.
2. Remove the inductors L4 and L5 in the transmitter circuit.
3. Change sinter on the IR version to a baffle plate.
4. Ampcontrol address was changed from 250 Macquarie Road, Warners Bay NSW 2282 to 7 Billbrooke Close, Cameron Park NSW 2285.

These changes were assessed in Test Report AU/TSA/ExTR08.0004/00.

Conditions of Certification pertaining to Issue 1 of this Certificate:

1. It is a condition of safe use that the following input parameter of the apparatus for terminal J5 shall be taken into account during installation:

Parameters	J5 terminals
U_i	16.5 V
C_i	40 nF
L_i	0 mH

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2. It is a condition of safe use that the remote sensor head shall be connected through a specified cable, which has parameters of 206 nF/km and 423 µH/km. The cable length shall not exceed 10 metres.

3. It is a condition of safe use that the programming connector J6, RS485 port J1 and the communication connector J3 are only to be used by the manufacturer in a safe area.

4. It is a condition of safe use that only 61-0203 combustible sensor shall be used in the apparatus.

Drawing list pertaining to Issue 1 of this Certificate:

Document No.	Sheets	Document Title	Issue	Date (yyyy/mm/dd)
75-6551L	1 of 4	Sensor CPU Catalytic (*Schematic*)	V4H	2004/05/12
75-6551L	3	Sensor CPU Catalytic (*Schematic*)	V4i	2008/04/30
24-6551L	1	Sensor CPU Catalytic (Top Overlay)	V4	2006/11/15
24-6551L	1	Sensor CPU Catalytic (Bottom Overlay)	V4	2006/11/15
24-6551L	1	Sensor CPU Catalytic (Top Layer)	V4	2006/11/15
24-6551L	1	Sensor CPU Catalytic (Bottom Layer)	V4	2006/11/15
24-6551L	1	Sensor CPU Catalytic (Drill Drawing)	V4	2006/11/15
75-6556L	1 of 2	GasGuard SM PSU (*Schematic*)	4	2004/05/13
75-6556L	2 of 2	GasGuard SM PSU (*Schematic*)	6	2008/04/30
24-6556L-V4	1	GasGuard SM PSU (PCB Top Overlay)	4	2004/05/05
24-6556L-V4	1	GasGuard SM PSU (PCB Top Layer)	4	2004/05/05
24-6556L-V4	1	GasGuard SM PSU (PCB Bottom Layer)	4	2004/05/05
24-6556L-V4	1	GasGuard SM PSU (PCB Drill Drawing)	4	2004/05/05
23-5503L-01	1	Fuse, Intrinsically Safe General Arrangement	5	2007/01/31
65-6551CH4-02	1	Catalytic Detector CH4 In Stainless Steel Enclosure Layout & Wiring	11	2007/03/01
61-0203GG-01	1	Remote Head Catalytic Nemoto Detector Heavy Duty Enclosure General Assembly	3	2004/04/28
23-6550LB-01	1	Stainless Steel Box Gasguard Sensor Enclosure Manufacturing Details	5	2005/10/13
23-6550LL-01	1	Stainless Steel Box Lid Various Sensor Enclosure Manufacturing Details	7	2003/09/16
110020-01-00-MD-01	1	Label CH4 In S/Steel Enclosure Manufacturing Details	1	2008/04/30
110924-00-00-MD-01	1	Support, Membrane H.D I.R Sensor Manufacturing Details	0	2008/04/17
110015-00-01-GA-01	1	Sensor Gasguard Infrared General Assembly	0	2008/04/16

IECEx Certificate of Conformity Annexe

Annexe for Certificate No.:	IECEx TSA 06.0044X	Issue No.:	2

Variation permitted by Issue 2:

1. Drawing 75-6565L-VE2 changed to 75-6565L-VE3:

   R1 and R4 removed.

2. Drawing 75-6551L Rev. V4i changed to V4j. Sheet 2 of 4:

   G1, C12 and C14 may be fitted as required.

   C23 may be removed as required.

3. The manufacturer name and address were changed from Austech Instruments Pty Ltd, 8 Ponderosa Parade, Warriewood NSW 2102, Australia to Ampcontrol CSM Pty Ltd, 9/5 Vuko Place, Warriewood NSW 2102, Australia

   These changes were assessed in Test Report AU/TSA/ExTR11.0081/00.

Conditions of Certification pertaining to Issue 2 of this Certificate:

Conditions of Certification are unchanged from previous issues of the certificate.

Drawing list pertaining to Issue 2 of this Certificate:

Document No.	Sheets	Document Title	Issue	Date (yyyy/mm/dd)
75-6565L-VE3	1	GasGuard IR CO2 Isolation Board	E3	2011/10/28
75-6551L	2 of 4	Sensor CPU Catalytic	V4j	2011/10/28

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